

REMARKS/ARGUMENTS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 15-28 are pending in the present application. Claims 1-14 are cancelled and new Claims 15-28 are added by present amendment. No new matter has been added.

In the outstanding Office Action, Claims 6, 8, and 10 are objected to under 37 C.F.R. 1.75(c). Thus, Claims 7, 9, and 11-14 were not examined. Claim 1 was rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent 5,400,036 by Kochiyama et al (hereinafter Kochiyama). Claims 2-5 were indicated as containing allowable subject matter.

Applicant acknowledges with appreciation the indication of allowable subject matter.

The specification is amended to correct various informalities noted by Applicant and to add section headings per MPEP 608.01(a). New Claims 15-28 correspond to original Claims 1-14, albeit revised to more clearly describe and distinctly claim Applicant's invention. No new matter has been added.

Claim 14 is directed to a method of estimating a channel and a direction of arrival (θ) of a signal received by an array of antennae after being propagated along at least one path, comprising, for each path. The method includes three steps. In the first step, the total phase differences for each path, (ξ_i) from the signals received by the different antennae in the array x_i are estimated. In the second step, the angle of arrival (θ) of the signal, as well as a phase rotation (ν) undergone by the signal along the at least one path, are estimated using each of the antennae total phase differences determined in the first step. In the third step, "an attenuation (α) undergone by the signal along the at least one path is estimated from estimated values ($\hat{\nu}, \hat{\theta}$) of the phase rotation (ν) and the angle of arrival (θ). The total phase shift difference is the sum of the phase rotation and a phase shift due to difference in

operation of the antennae in the array that is dependent on the angle of the arrival θ .¹

Independent Claim 24 is an apparatus claim corresponding to new Claim 14.

Kochiyama describes a method for calculating a phase shift relative to a difference in operation between an antenna l and a reference antenna 1 corresponding to an angle of arrival.² However, contrary to the Office Action,³ Kochiyama does not disclose or suggest a common phase rotation undergone by the signals received by all antennae. The citation of Kochiyama relied upon for the rejection merely describes determining the phase shift due to the difference in operation between the antenna l and the reference antenna 1 at the angle of arrival, without any reference to the phase rotation undergone by the signal as traveling from source to the array of antennae. That is, as shown in equations 3 and 14 of Applicants' original specification, the total phase difference for each path, (ξ_l) estimated in Applicants' claimed method includes taking into account additional estimation parameters not addressed in Kochiyama. That is, in Kochiyama, the phase difference for each path Φ is equal to $(\cos \theta) 2\pi D / \lambda$ and does not include any consideration of phase rotation (ν) .

As Kochiyama does disclose or suggest all the elements of independent Claims 14 and 24, Applicant submits the inventions defined by Claims 14 and 24, and all claims depending therefrom, are not rendered obvious by the asserted prior art for at least the reasons stated above.⁴

¹ Specification, page 6, formula (3), lines 10-14.

² Specification, page 9, formula (14), lines 11-14; compare formula (14) with formula (10) in Kochiyama column 6, where ϕ corresponds to ξ in Applicant's specification, to note that the phase rotation ν is not considered in Kochiyama.

³ Office Action dated November 24, 2004, page 2, paragraph 4 in section "Claim Rejection – 35 USC § 103"


⁴ MPEP § 2142 "...the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. In re Vaack, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)."

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Consequently, in light of the above discussion and in view of the present amendment, the present application is believed to be in condition for allowance, and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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